(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
27 June 2002 (27.06.2002)

PCT

(10) International Publication Number
WO 02/51038 A1

(51) International Patent Classification[7]: H04B 7/26

(21) International Application Number: PCT/EP01/12991

(22) International Filing Date:
5 November 2001 (05.11.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0031111.8 20 December 2000 (20.12.2000) GB

(71) Applicant *(for all designated States except US)*: **MOTOROLA INC** [US/US]; 1303 E.Algonquin Road, Schaumburg, IL 60196 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **KOURTIS, Stamatis** [GR/GB]; 16 Alleyn Court, 123-127 Sussex Gardens, London, Greater London W2 2RZ (GB). **KOTZIN, Michael, D.** [US/US]; 321 Fox Hill Drive, Buffalo Grove, IL 60089 (US). **BENSON, Maya** [GB/GB]; 20 Thurney Drive, Grange Park, Swindon, Wiltshire SN5 6EP (GB).

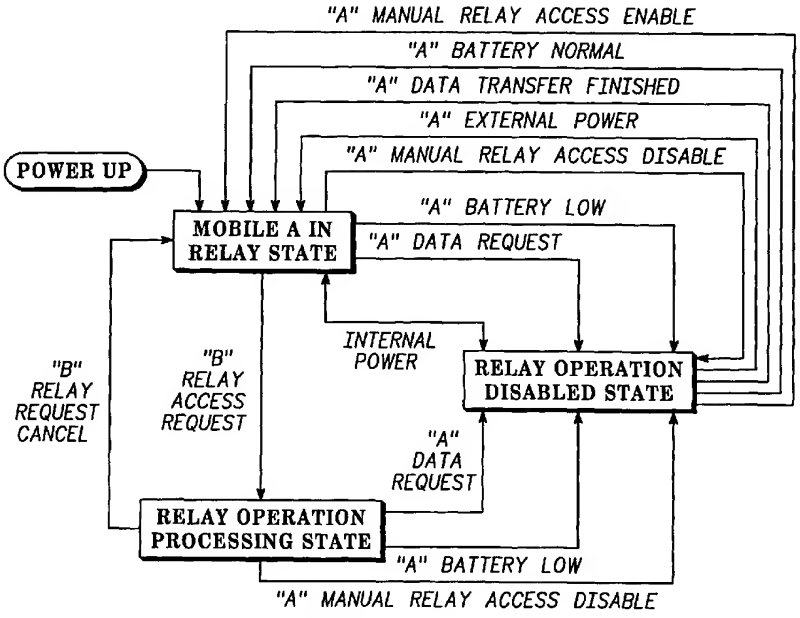
(74) Agent: **POTTS, Susan**; Motorola European Intellectual, Property Operations, Midpoint, Alencon Link, Basingstoke, Hampshire RG21 7PL (GB).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: BILLING METHOD AND DEVICE USING MOBILE EQUIPMENT AS RELAY



(57) Abstract: The invention relatires to a communication device having a relay operating mode and a non-relay operating mode, where the mode is selectable by the user or in response to the operational status of the communication device. In this way, the use of relay modes of operation, such as Opportunity Driven Multiple Access (ODMA) is facilitated, leading to better network operation. The invention also relates to a method and appartus for billing for communications services which enables users to be rewarded by network operators for relay operating mode operation of the communication device of the user.

WO 02/51038 A1

Published:
— *with international search report*
— *entirely in electronic form (except for this front page) and available upon request from the International Bureau*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

BILLING METHOD AND DEVICE USING MOBILE EQUIPMENT AS RELAY

This application relates to a communication device and to a method of billing for communications services provided to the communication device. In particular, this application relates to a communication device which can operate in a relay mode in which the communication device forwards received signals not intended for the communication device and to a billing method which rewards use of the relay mode in the communication device.

Generally in order to set up a communications channel to a called device in existing communication systems, a communication device will communicate directly with the called communication device or will communicate with a device which provides access to a network through which a call between the communication device and the called device is established.

In some situations it may not be possible for a communication device to establish a communication link with the called communication device or with the network access device. This situation may arise, for example, as a result of interference or unevenness in the network coverage or when a base station of a cellular communication system reaches its capacity and is therefore unable to accommodate further users.

Alternatively, it may not be possible for a communication device to establish a communication link of a desired quality or type. This situation may arise, for example, if the communication device requires a high data rate service but is outside a high data rate coverage area.

Opportunity Driven Multiple Access (ODMA) has been proposed to overcome this problem. Figure 1 illustrates Opportunity Driven Multiple Access (ODMA) in the context of a cellular communication system. Mobile stations MS1 and MS2 are in

the cell served by base station BS1 and mobile station MS3 is located in the cell served by base station BS2.

Mobile station MS1 is unable to communicate with the base station BS1 but can communicate with mobile station MS2. Similarly, mobile station MS2 is also unable to communicate with BS1 but is able to communicate with mobile station MS3. Mobile station MS3 is able to communicate with base station BS2. Thus mobile station MS1 is able to communicate with base station BS2 using the mobile stations MS2 and MS3 as relay stations. Thus in Opportunity Driven Multiple Access (ODMA) systems, mobile stations used as relay systems can improve the throughput and performance of other mobile stations in the vicinity whose respective links with their serving base station are experiencing deep fade.

ODMA is a communications relaying protocol which may be used to increase the efficiency of the Third Generation Partnership Project Time Division Code Division Multiple Access standards 3GPP-TDD (TD-CDMA). At present it is under consideration whether it should be used in the Third Generation Partnership Project Frequency Division Wideband Code Division Multiple Access standards 3GPP-FDD (W-CDMA). Consequently, ODMA can be used in every communication device using the 3GPP-TDD air interface (single-mode or multi-mode terminals) and if ODMA is incorporated in 3GPP-FDD potentially could be used in every third generation communication device.

The use of ODMA could potentially enhance dramatically the overall system performance by overcoming interference, coverage and capacity limitations of current communication systems. As a result, the use of ODMA is advantageous for network operators.

However, it has a significant disadvantage from the point of view of the user of the communication device in that when operating as a relay the communication

device utilizes resources but without providing any direct benefit to the user of the communication device. For example by acting as a relay the communication device will be active for a greater proportion of time thereby depleting the battery at a faster rate than if the communication device were not acting as a relay.

Increasingly communication devices are provided with a short range adjunct means such as Bluetooth™ or IR functionality to enable the communication device to communicate with other communication devices over short distances. It is advantageous to enable aggregation of subscriber devices which are close to one another. However, again, operation in an aggregated mode has a significant disadvantage from the point of view of the user of the communication device in that the aggregated communication device utilizes resources but without providing any direct benefit to the user of the communication device. For example the aggregated communication device will be active for a greater proportion of time thereby depleting the battery at a faster rate than if the communication device were not acting as a relay.

The present invention seeks to alleviate at least some of these disadvantages.

In accordance with a first aspect of the invention, there is provided a communication device operable in a relay operating mode, in which a signal not intended for the communication device received from a second communication device is passed on to a third communication device, and in a non-relay operating mode, the operating mode being selectable in response to an input from the user of the communication device and/or the operational status of the communication device.

It will be clear that the second and the third communication devices are not necessarily communication devices in accordance with the invention, but are merely devices which can communicate with the communication device of the present invention.

The communication device may have a user interface to enable user selection of the operating mode. The user selection of operating mode may be over-ridden if the operational status of the communication device alters. In particular, the non-relay operating mode may be selected after a user selection of the relay operating mode in response to a change in the operational status of the communication device.

A change in the operational status of the communication device might be detection of a low battery status of the communication device or of a communication capability requirement status of the communication device. A communication capability requirement status might indicate, for example, a requirement to transfer high speed data or a requirement for a determined quality of service.

The operational status of the communication device may be the power supply status. In particular, the relay operating mode may be selected when the communication device is connected to or powered by an external power source, such as the mains power supply. This enables the communication device to operate in the relay operating mode without significant disadvantageous consequences, such as depletion of the battery, to the user. The communication device may be arranged such that the selection of the relay operating mode occurs irrespective of the user, but more preferably the communication device is arranged such that the user can choose whether or not to enable selection of the relay mode when connected to or powered by an external power source. This choice is preferably made by means of a menu on a user interface.

The communication device preferably has means for detecting the presence of at least one other communication device in the vicinity and for establishing an aggregated status therewith. Advantageously, the communication device communicates with nearby devices using a Bluetooth™ or IR signal.

Preferably the communication device has means for informing a communication billing system of the operating mode of the communication device. In particular, the communication device may inform the communication billing system of the selection of the relay mode and/or the non-relay mode. Alternatively or additionally, the communication device may inform the communication billing system of the actual use of the communication device as a relay node.

In accordance with a second aspect of the invention there is provided a method of billing for communications services provided to a communication device in a communications system in which information relating to the operating mode of the communications device is used in billing calculation.

According to third aspect of the invention there is provided a communications system billing system for carrying out the method in accordance with the invention. The billing system in accordance with this aspect of the invention has storage means for storing information relating to the operating mode of the communication device, and means for billing calculation, where the means for billing calculation uses the information relating to the operating mode of the communication device for billing calculation.

The use of information relating to the operating mode of the communication device to the communication system billing system enables the operator to reward the user for operation of the communication device in a relay mode. The operator may reward the user on the basis of the amount of time that the communication device spends in the relay mode, or on the basis of some measurement of the benefit to the operator. This could relate to the number of times that the communication device actually acts as a relay, or to the time of day or location of the communication device. The operator may reward the user, for example, by using a more favorable tariff or by applying a credit against the user's bill. Alternatively, for example, the user may be rewarded by receiving

advertising promotions or free downloads of, for example MP3 or MPEGs files. Clearly other reward structures are feasible.

For a better understanding of the present invention, and to show how it may be brought into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 illustrates Opportunity Driven Multiple Access (ODMA) in the context of a cellular communication system;

Figure 2 illustrates the operation of a communication device in accordance with a first embodiment of the present invention;

Figure 3 illustrates the operation of a communication device in accordance with a second embodiment of the present invention;

Figure 4 illustrates an exemplary billing system in accordance with the invention.

Embodiments of the invention will now be described with reference to Figures 2-4 of the accompanying drawings.

Figure 2 illustrates the operation of a communication device in accordance with a first embodiment of the present invention. When the communication device is switched on (step 21) it determines whether the communication device is powered by an external power supply, such as the mains power supply, or an internal power supply, such as a battery (step 22). If the communication device is determined to be powered by an external power supply in step 22, it switches to relay operating mode (step23). In the relay operating mode the communication device can be used by other communication devices as a relay, when a link between them and a network has to be established, for example. In addition, the communication device may aggregate its communication resources, for example using Bluetooth ™ or IR technology. Since the communication device is externally powered rather than internally powered it can become a reliable ODMA relay. Thus, overall network performance can be enhanced without giving

rise to problems with the battery life of the communication devices, which benefits communication system operators and subscribers.

If the communication device is determined to be powered by an internal power supply in step 22, it switches to non-relay operating mode (step 24) and continues to function as a normal communication device. Thus, the battery life of the communication device will depend only on the subscriber's useage of the communication device. In this way disadvantages associated with allowing the communication device to be used as a relay station for ODMA or aggregation, such as unexpected drain of the battery of the communication device, are avoided.

Thereafter the state of the power source is continually monitored and the mode of operation of the communication device is changed between the relay operating mode and non-relay, or normal, operating mode accordingly. Since the relay mode is switched off once the communication device becomes battery powered, the subscriber does not suffer from any adverse consequences as a result of the relay operation of the communication device.

Clearly, in some situations it is desirable to allow a user to disable or enable the automatic operation of the first embodiment of the invention by way of a user interface menu item which could be presented to the user on initial power on or on connection to the external power supply, for example. The operation of this alternative embodiment is shown by additional steps 25a and 25b in Figure 2.

Advantageously the communication device provides the network with information relating to whether the communication device is in relay operation mode. This is preferably achieved by sending a message informing the network about the start of the relay operation mode in steps 26a, 26b, 26c and 26d and by sending a message informing the network about the end of the relay operation mode in step 27a and 27b.

Figure 3 illustrates the operation of a communication device in accordance with a second embodiment of the present invention.

In this embodiment of the invention, on power up of the communication device (step 31) the communication device enters a relay operation mode as the default mode (step 32) in which the relay operation mode is enabled. Clearly, it would be possible for the default state of the communication device to be the non-relay operating mode, or for the relay operating mode or the non-relay operating mode to be selectable by the user, for example by way of a user interface start-up menu.

If a communication device A in the relay operation mode receives a relay request, such as an ODMA access request, from a communication device B, communication device A enters a relay processing mode (step 33).

If communication device B subsequently cancels the relay request, the communication device A returns to the relay operation mode (step 32). Alternatively, if either a user-entered command or an operational status such as a low battery or a request for high speed data occurs, the communication device leaves the relay processing mode and enters a non-relay operation mode (step 34).

Equally, if either a user-entered command or an operational status such as a low battery or a request for high speed data occurs, the communication device leaves the relay operation mode (step 32) and enters the non-relay operation mode (step 34).

Finally, if either a user-entered command or an operational status such as a normal battery indication occurs or a high speed data transfer ends, the

communication device leaves the non-relay operation mode (step 34) and enters the relay operation mode (step 32).

Thus it can be seen that a user A can choose to enter a relay group at a time convenient to the user so that another user ie user B can then make use of user A's radio resource.

Again, advantageously the communication device provides the network with information relating to whether the communication device is in relay operation mode. This is preferably achieved by sending a message informing the network about the start of the relay operation mode (step 32) and by sending a message informing the network about the end of the relay operation mode (step 32).

Alternatively or additionally the communication device may provide the network with information relating to whether the communication device is in relay processing mode. This may be achieved, for example, by sending a message informing the network about the start of the relay processing mode (step 33) and by sending a message informing the network about the end of the relay operation mode (step 33).

An exemplary billing system in accordance with the invention will now be described with reference to Figure 4.

In the exemplary billing system 40 shown in Figure 4, a storage means 41 is provided. Advantageously, this is computer memory. This storage means 41 may be separate and dedicated storage or may be part of storage, such as computer memory, provided in existing billing systems, for storing information relating to subscribers which is relevant to billing.

The storage means 41 contains information relating to the operating mode of at least one communications device associated with a subscriber to which

communication services are provided. This information may relate to the length of time the communication device operates in the relay operating mode or the number of times the communications device operates in the relay operating mode or to the time of day or the position of the communications device when operating in the relay operating mode.

Preferably the billing system is adapted to receive such information from the communication device via the network, or from the network.

The billing system 40 also contains billing means 42 for determining billing for said subscriber. The billing means uses the information relating to the operating mode of said at least one communications device which is stored in the storage 41 in said determination.

The billing means 42 may apply a reduction in the bill or a credit to the subscriber bill or may apply one of a plurality of billing tariffs based on the information in said storage means 41.

As is clear, there are significant system benefits to allowing aggregation of subscriber devices.

CLAIMS

1. A communication device operable in a relay operating mode, in which a signal not intended for the communication device received from a second communication device is passed on to a third communication device, and in a non-relay operating mode, the operating mode being selectable in response to an input from the user of the communication device and/or the operational status of the communication device.

2. The communication device as claimed in claim 1, having a user interface to enable user selection of the operating mode.

3. The communication device as claimed in claim 1 or 2, wherein the relay operating mode is selected when the communication device is powered by an external power source.

4. The communication device as claimed in claim 1 or 2, wherein the non-relay operating mode is selected in response to a low battery status of the communication device.

5. The communication device as claimed in one of claims 1-4, wherein the non-relay operating mode is selected in response to a communication capability requirement status of the communication device.

6. The communication device as claimed in one of claims 1-5, wherein the communication device has means for detecting the presence of at least one other communication device in the vicinity and for establishing an aggregated status therewith and enters the relay operating mode in response to the established aggregated status of the communications device.

7. The communication device as claimed in one of claims 1-6, wherein a signal received from a second device in a first format is passed on to a third device in a second format.

8. The communication device as claimed in claim 7 wherein the first or second format signal is a Bluetooth™ format or IR format signal and the second or first format signal respectively is an RF format signal.

9. The communication device as claimed in any preceding claim having means for informing a communication billing system of the operating mode of the communication device.

10. A method of billing for communications services provided to a communication device as claimed in claim 9 in a communications system in which information relating to the operating mode of the communications device is used in billing calculation.

11. A method of billing for communications services as claimed in claim 10 wherein the billing calculation for communications services provided to the communication device is related to the length of time the communication device operates in the relay operating mode.

12. A method of billing for communications services as claimed in claim 10 or 11 wherein the billing calculation for communications services provided to the communication device is related to the number of times the communications device operates in the relay operating mode.

13. A method of billing for communications services as claimed in one of claims 10-12 wherein the billing calculation for communications services provided to the communication device is related to the time of day or the position of the communications device when operating in the relay operating mode.

14. A method of billing for communications services as claimed in one of claims 10-13, wherein the billing calculation for communications services provided to the communication device includes a reduction in the bill or a credit.

15. A method of billing for communications services as claimed in one of claims 10-14, wherein the tariff used for billing calculation for communications services provided to the communication device depends on information relating to the operating mode of the communications device.

16. A communication services billing system, comprising:

storage means for storing information relating to the operating mode of at least one communications device associated with a subscriber to which communication services are provided; and

billing means for determining billing for said subscriber, wherein the billing means uses said information relating to the operating mode of said at least one communications device in said determination.

17 The communication services billing system as claimed in claim 16 wherein the storage means stores information relating to the length of time the communication device operates in the relay operating mode or the number of times the communications device operates in the relay operating mode or to the time of day or the position of the communications device when operating in the relay operating mode.

18. The communication services billing system as claimed in claim 16 or 17, where the billing means applies a reduction in the bill or a credit to the subscriber bill.

19. The communication services billing system as claimed in claim 16 17 or 18, where the billing means applies one of a plurality of billing tariffs based on the information in said storage means.

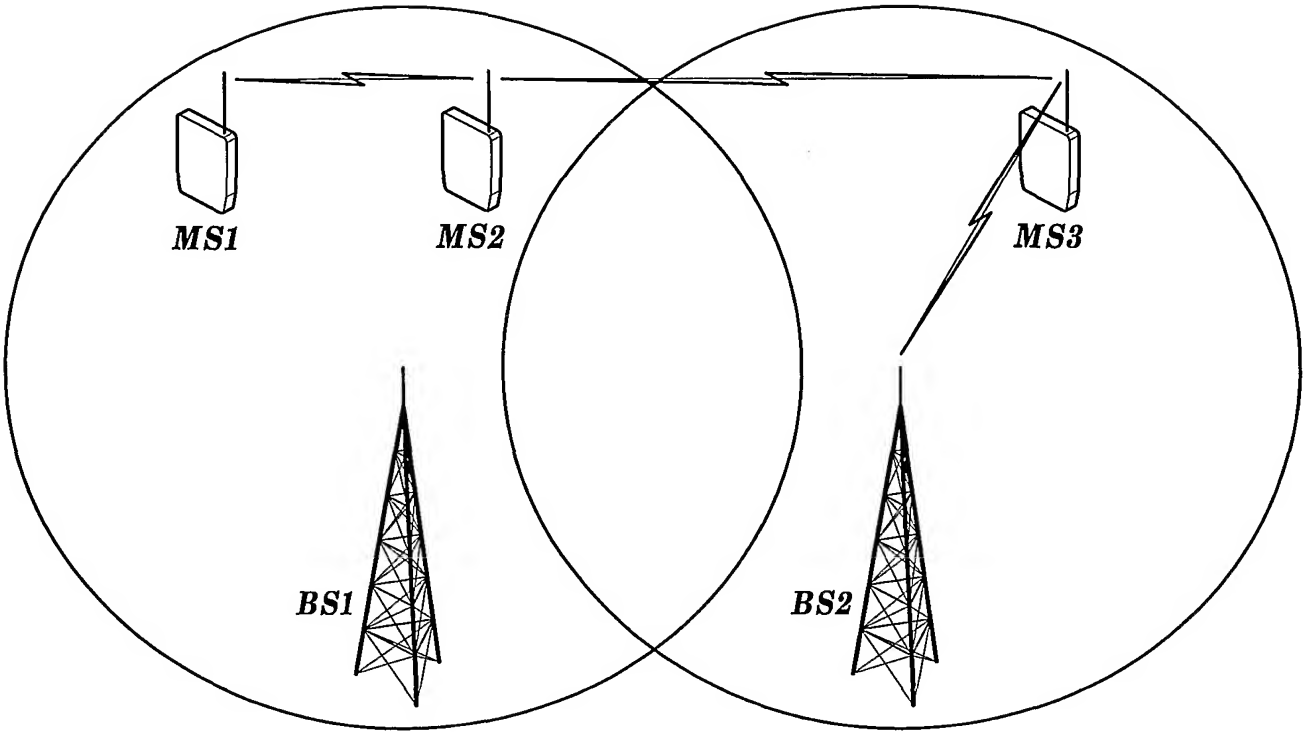

MS1
MS2
MS3
BS1
BS2

FIG. 1

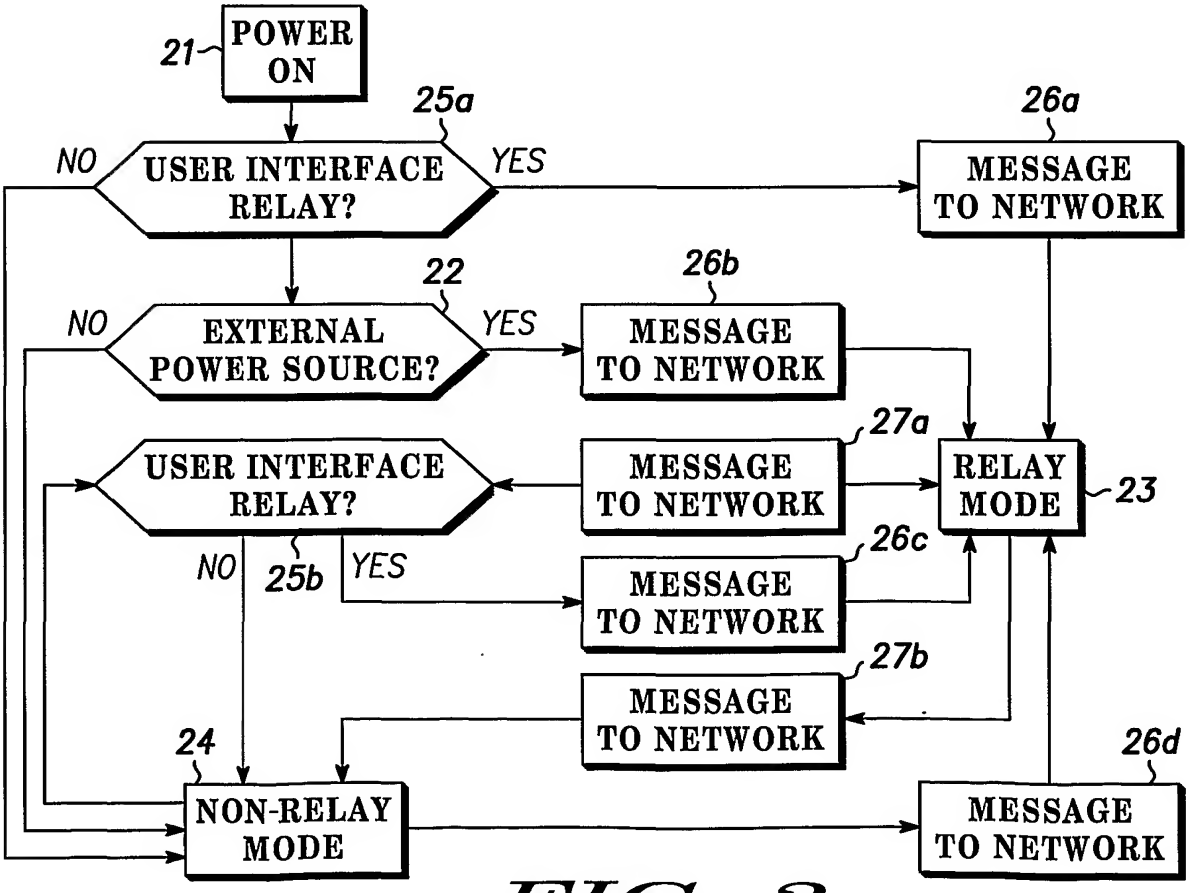

21
POWER ON
25a
NO
USER INTERFACE RELAY?
YES
26a
MESSAGE TO NETWORK
22
26b
NO
EXTERNAL POWER SOURCE?
YES
MESSAGE TO NETWORK
27a
USER INTERFACE RELAY?
MESSAGE TO NETWORK
RELAY MODE
23
NO
25b
YES
26c
MESSAGE TO NETWORK
27b
MESSAGE TO NETWORK
24
26d
NON-RELAY MODE
MESSAGE TO NETWORK

FIG. 2

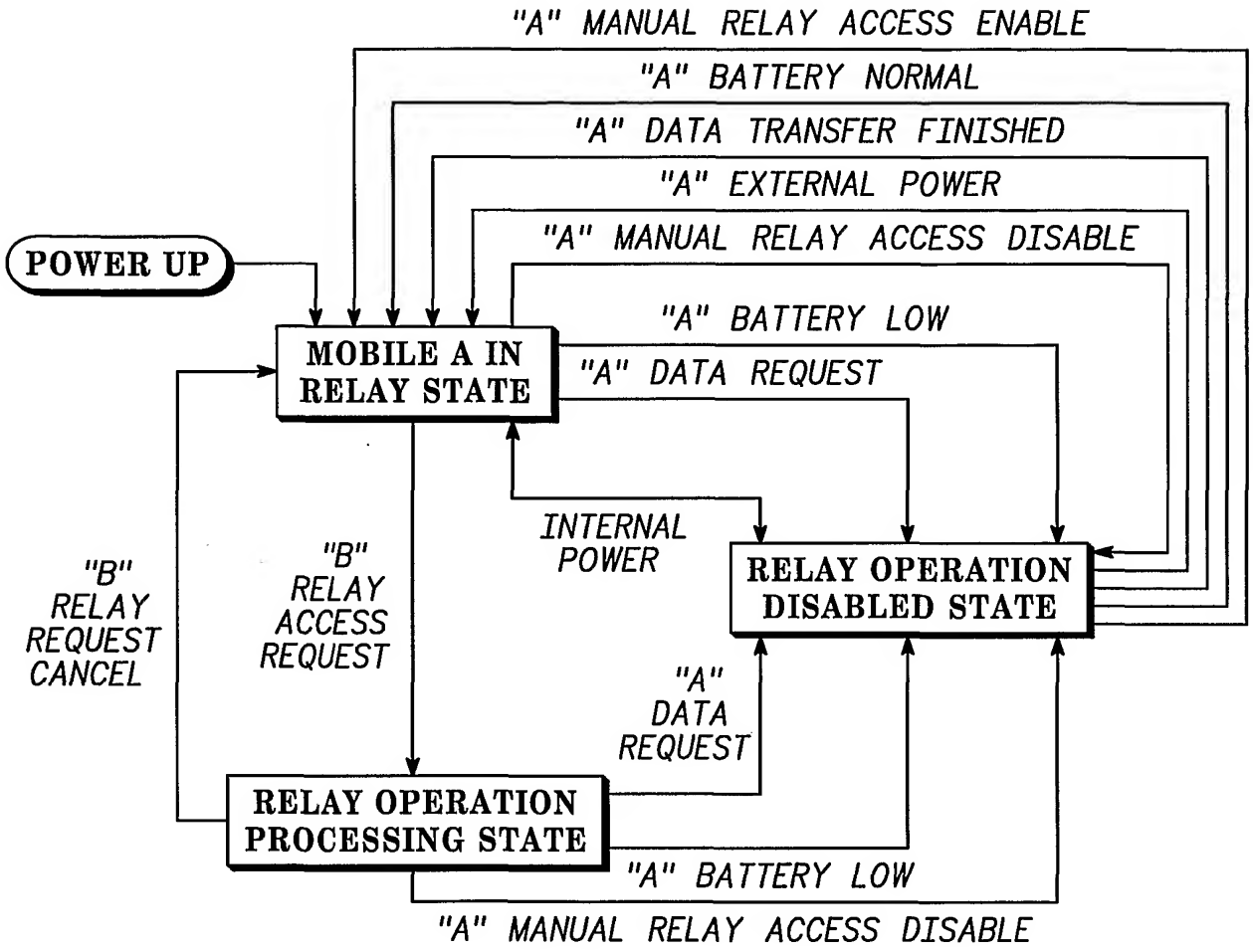

"A" MANUAL RELAY ACCESS ENABLE
"A" BATTERY NORMAL
"A" DATA TRANSFER FINISHED
"A" EXTERNAL POWER
"A" MANUAL RELAY ACCESS DISABLE
POWER UP
"A" BATTERY LOW
MOBILE A IN RELAY STATE
"A" DATA REQUEST
INTERNAL POWER
RELAY OPERATION DISABLED STATE
"B" RELAY REQUEST CANCEL
"B" RELAY ACCESS REQUEST
"A" DATA REQUEST
RELAY OPERATION PROCESSING STATE
"A" BATTERY LOW
"A" MANUAL RELAY ACCESS DISABLE

FIG. 3

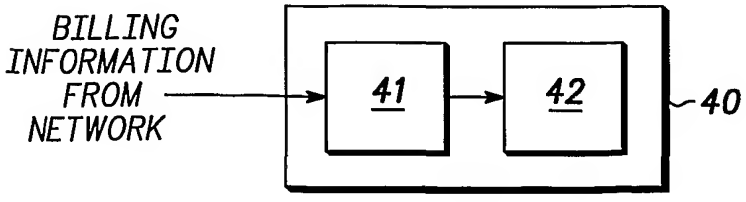

BILLING INFORMATION FROM NETWORK
41
42
40

FIG. 4

INTERNATIONAL SEARCH REPORT

Int[illegible]ial Application No
PCT/EP 01/12991

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04B7/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04B H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
WPI Data, EPO-Internal, INSPEC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 01 47181 A (NOKIA NETWORKS OY ;NAKAGAWA TOMOHIRO (JP)) 28 June 2001 (2001-06-28) page 2, line 16 -page 3, line 5 page 4, line 4 - line 13 page 5, line 8 -page 6, line 7	1-8
X	WO 99 46899 A (LOHER URS ;SWISSCOM AG (CH)) 16 September 1999 (1999-09-16)	1,2,5-7
Y	page 3, line 5 - line 33	8
A	page 9, line 11 - line 28 page 13, line 16 -page 14, line 7	3,4,9-19
X	WO 95 11561 A (SOUTHWEST WIRELESS SYSTEMS INC) 27 April 1995 (1995-04-27)	1,2,5-7
A	page 4, line 28 -page 5, line 27 page 12, line 21 -page 13, line 9	3,4,8-19

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 February 2002	27/02/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Sorrentino, A

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

In nal Application No
PCT/EP 01/12991

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
Y	HAARTSEN J C: "BLUETOOTH(TM): A NEW RADIO INTERFACE PROVIDING UBIQUITOS CONNECTIVITY" VTC 2000-SPRING. 2000 IEEE 51ST. VEHICULAR TECHNOLOGY CONFERENCE PROCEEDINGS. TOKYO, JAPAN, MAY 15-18, 2000, IEEE VEHICULAR TECHNOLGY CONFERENCE, NEW YORK, NY: IEEE, US, vol. 1 OF 3. CONF. 51, 15 May 2000 (2000-05-15), pages 107-111, XP000970589 ISBN: 0-7803-5719-1	8
A	paragraph '0001!	1-7,9-19
X	DE 195 35 021 A (ARNOLD JOERG DR) 10 July 1997 (1997-07-10)	1,2
A	column 1, line 66 -column 2, line 3 column 3, line 41 -column 4, line 7; claims 1-5	3-19
A	"TR 101 146 (v3.0.0), Universal Mobile Telecommunications Systems (UMTS);UMTS Terrestrial Radio Access (UTRA); Concept evaluation (UMTS 30.06 version 3.0.0)" ETSI TECHNICAL REPORT, XX, XX, December 1997 (1997-12), pages 33144-173, XP002128289 the whole document	1-19
A	WO 98 39936 A (TOMLINSON KERRY JOHN ;SALBU RES AND DEV PTY LTD (ZA); LARSEN JAMES) 11 September 1998 (1998-09-11) page 2, line 15 -page 3, line 25 page 7, line 7 - line 27 page 13, line 29 -page 15, line 22; figures 7A,7B,7C	1-19

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 01/12991

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0147181 A	28-06-2001	AU 2389201 A	03-07-2001
		WO 0147181 A2	28-06-2001
WO 9946899 A	16-09-1999	AT 211594 T	15-01-2002
		AU 1234799 A	27-09-1999
		WO 9946899 A2	16-09-1999
		EP 1064760 A2	03-01-2001
WO 9511561 A	27-04-1995	WO 9511561 A1	27-04-1995
DE 19535021 A	10-07-1997	DE 19535021 A1	10-07-1997
WO 9839936 A	11-09-1998	AU 738746 B2	27-09-2001
		AU 6630798 A	22-09-1998
		BR 9808149 A	28-03-2000
		CN 1255261 T	31-05-2000
		EP 0965203 A2	22-12-1999
		WO 9839936 A2	11-09-1998
		HU 0000860 A2	28-08-2000
		JP 2001513968 T	04-09-2001
		NO 994198 A	27-10-1999
		PL 335646 A1	08-05-2000